Minergy Corporation
Glass Furnace Technology
Overview

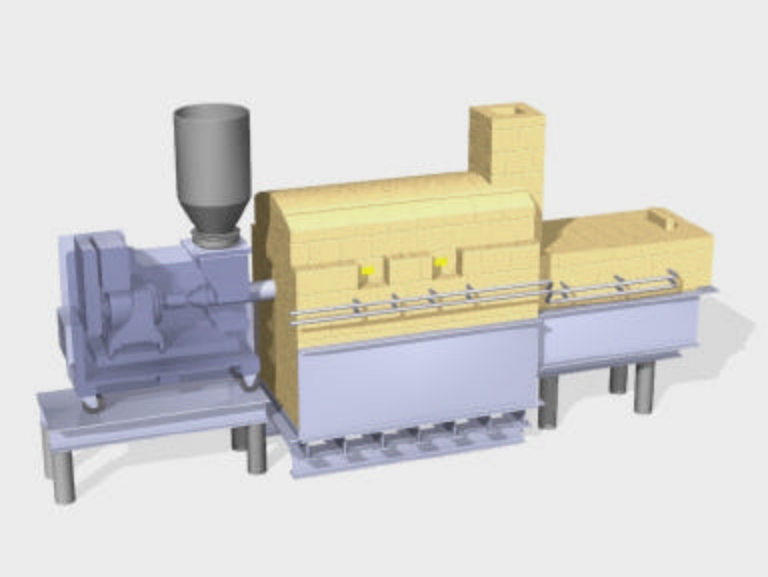

Fig 1. View of exterior of sediment melter

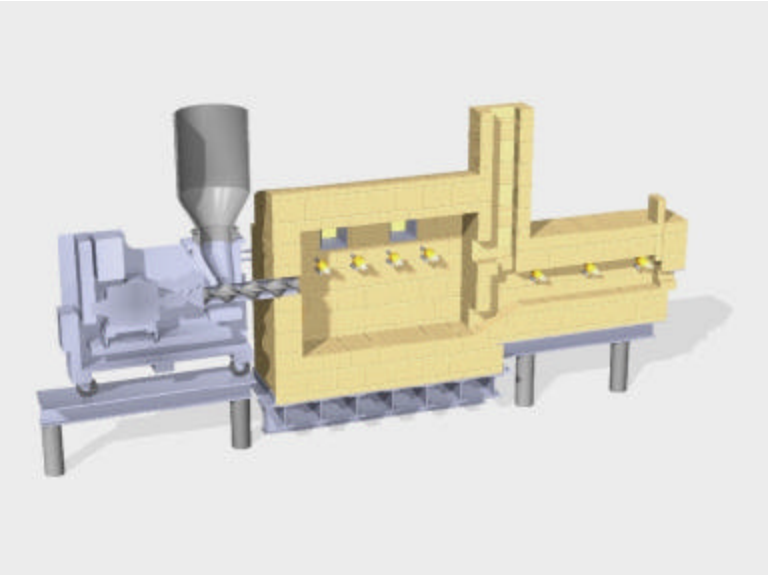

Fig 2. Internal view of empty melter with oxy-fuel burners in place (warm-up condition).

Introduction to Glass Furnaces

A glass furnace is a refractory-lined, rectangular melter.

Refractory is brick or concrete which has been specially treated to resist chemical and physical abrasion, has a high melting point, and provides a high degree of insulating value to the process.

Current glass furnaces use oxy-fuel burners, combining natural gas and oxygen for a bright flame above the glass. These burners raise the internal temperature of the melter to 2900 degrees Fahrenheit.

At these high temperatures, PCB contaminants are destroyed, and the sediment melts and flows out of the processing system as molten glass.

The molten glass is water quenched to produce an inert aggregate that is marketed to construction companies.

Pilot Melter Characteristics

Aspect Ratio	2:1
Area	10 sq ft.
Melting Rate	5.4 ft.²/ton
Dwell Time	6 hrs.
Gas Usage	1.7 MM Btu/hr.
Oxygen Usage	35 ccfh
Spec Energy	20.9 mmbtu/ton
Output	2 tons/day

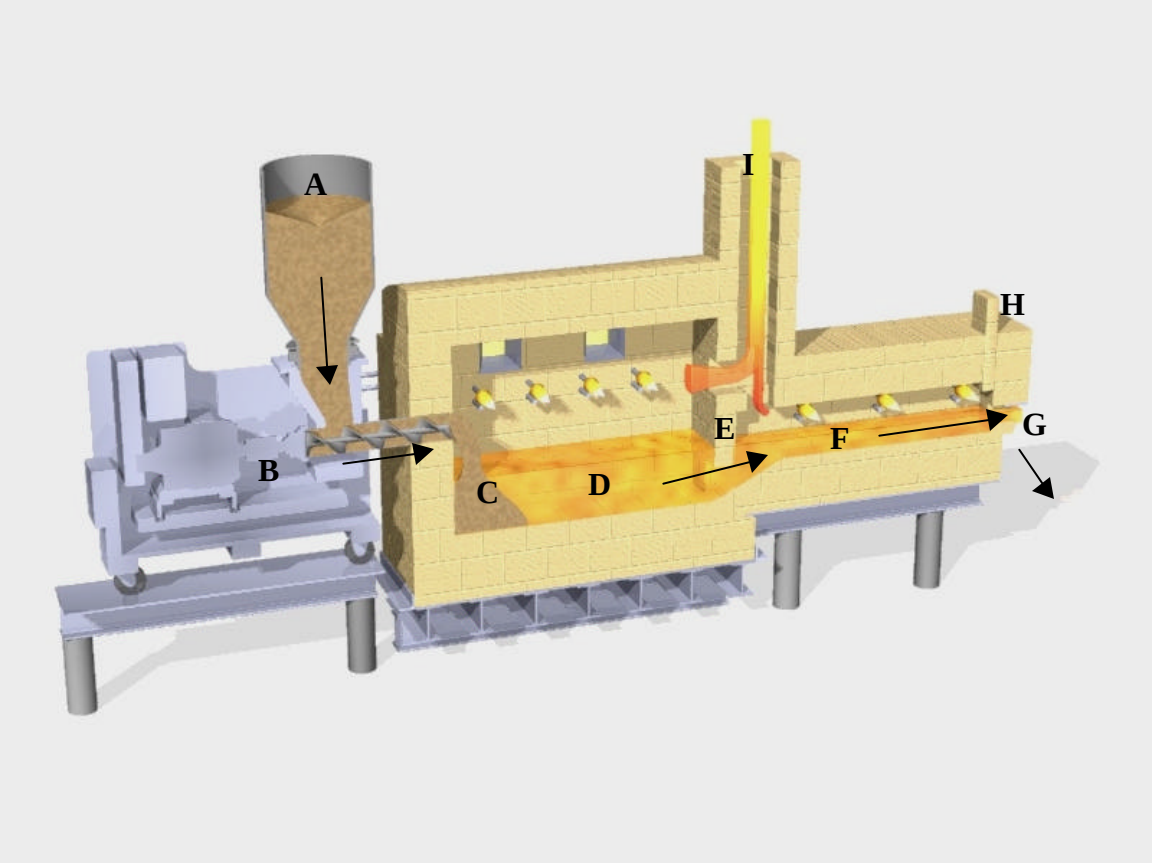

Fig 3. Internal view of melter (sediment feeding and melting)

Process Description

Sediment (A) is fed to the hopper above the screw feeder (B). The feeder conveys the sediment continuously into the main section of the melter (C). The extremely high temperatures in the melter cause the sediment to become molten, liquid glass (D). The molten glass flows under a skimmer block (E), into the forehearth (F), where the material continues to form a stable glass. At the end of the melter, the glass flows out (G) into a water quenching tank. A removable block is included at the end of the forehearth (H) to stop the flow of glass if desired. Exhaust gases (I) flow out from the furnace up the square flue, to the air sampling equipment.

The high temperature environment provides complete destruction of any organic compounds that may be contained in the sediment. Many trace metals found in the sediment are permanently stabilized in the melting and quenching process, producing a final product that is very inert. Off-gas treatment is simplified and energy efficiency improved due to melter's use of purified oxygen rather than atmospheric air as the oxidation source.

The pilot melter is designed to simulate a full-scale production melter for the generation of glass aggregate from sediments. In order to adequately produce a model, some assumptions have been made with regard to the full-scale melter in accordance with typical glass operating practices. The pilot melter is scaled down from the full-scale melter and has been designed to operate in a manner which would suggest design features for most major elements of the full scale melter.

Refractory selection has been developed for this pilot melter based on the heat flow analyses for each construction type. These are used to insure that none of the materials is placed in temperatures beyond their capability and to determine the total heat loss of the entire system.